Expository Statement

Grantee: **Microsoft® Corporation**
Model: **Microsoft® Wireless Desktop Elite Keyboard**
Model No. : **1011**
Option : **USB and PS/2, flat keyboard**

KEYBOARD TRANSMITTER:

The Microsoft® **Wireless Desktop Elite Keyboard** is a computer input devices typically used for data input, conventional cursor control, numerical keypad, internet and multimedia control, and the Scroll Wheel can be used for scrolling up/down and left/right as cursor movement control. When a user presses a key on the keyboard or scroll on the wheel, the circuitry within the keyboard detects this key switch closure and translates it into a form usable by the host computer.

The keyboard controller operates from a 8MHz clock speed derived from a 8MHz ceramic resonator. The controller takes its power from 3 (three) AA batteries and reads key stroke through a number of scan outputs and sense inputs. The scan outputs are connected to a Mylar sheet with conductive ink going from the scan output to the key switches. A separate Mylar sheet goes from the key switches to the sense inputs. When a key switch is pressed, conductive ink traces on the two Mylar sheets are connected, and a given scan output is connected to a given sense input. The controller detects which key is pressed, and sends the appropriate RF codes to the receiver via a wireless 27MHz FSK data transmission through the transmitter circuit board. The keyboard controller also connected to an EEPROM to store the information to bind with the receiver and low voltage detector circuit to warn user when batteries is in low power condition.

The Scroll Wheel controller operates from a 3MHz clock speed derived from an internal RC oscillator. The controller takes its power from the same of keyboard 3 (three) AA batteries and reads the scroll up/scroll down activity through PTR (Photo Transistor) sense input with respect to the IR LED scan output of the Scroll Wheel. When the wheel is scrolled the controller will send the signals represent the directions and speeds of the scroll wheel to main keyboard controller to decode the scroll wheel data and sends the appropriate RF codes to the receiver through the 27MHz FSK data transmitter circuit board.

The transmitter operates on either one of the 2 channels: 27.095 MHz or 27.195 MHz and channel selection is accomplished by pressing the ‘Connect Channel’ button located underneath the keyboard. The transmitter uses Frequency Shift Keying (FSK) modulation, and consists of a crystal-controlled FSK modulator and an output driver. The crystal-controller modulator uses a 27.095 and 27.195MHz crystal. The radiated electric field of the transmitter is less than 54dBuV/m at 3 meters. To save the batteries, the controller switches ON the transmitter only in the active state of the keyboard. The active state continues about 500 milliseconds after the last movement or button press; then the keyboard goes in the sleep active state. The controller will resume from the sleep active states after receiving a signal from the interrupt driven I/O lines (sense lines).

The keyboard uses two double-sided printed circuit boards for main keyboard and RF module, and one single sided circuit board for Scroll Wheel module.
The first main board hosts the microcontroller, the battery connector, the keyboard matrix connectors, the scroll wheel board connector, the transmitter connector as well as the antenna connector. The second host the 27MHz RF transmitter with the antenna matching circuit and the connectors. The third single sided scroll wheel board host the microcontroller, connectors to the wheel and main board where the wheel contains a optical IR-LED/PTR components and the mechanical mechanism wheel.

The main board and the second RF board are connected through connector and hard soldered to each other. The main board and the third scroll wheel board are connected through membrane conductive inks traces mylar through the edge connectors between the two boards.

A loop antenna which surrounded the whole keyboard is connected to the main board

The keyboard complies with Microsoft® and IBM® PS/2 specifications as well as USB specifications. Where there is a discrepancy, the Microsoft® specification is used.